

PROTECTIVE ARRANGEMENT IN WEB CUTTING

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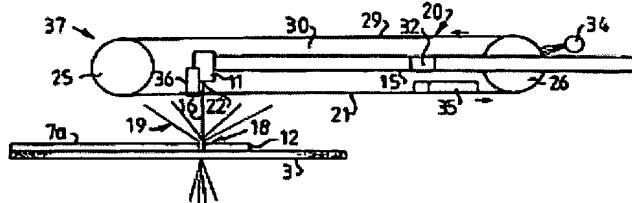


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Abstract of CA2419660

A protective arrangement (37) for a cutting equipment (10) for dividing a continuous fiber web (7) is described, said cutting equipment being arranged in a board or paper machine and includes at least one cutting member (16) for cutting the fiber web (7). In accordance with the invention the protective arrangement includes an endless belt member (20) movably arranged and having a straight run (21) between the cutting equipment and the fiber web to screen off at least an essential part of the cutting equipment from fibers which are released from the fiber web during the cutting. It also includes one or more cleaning members (34, 35) at least one of which being arranged in connection to the outside of the belt member at a distance from the cutting member, to remove the portion of the released fibers being caught by the belt member. The invention also relates to a board or paper machine that has such a protective arrangement.



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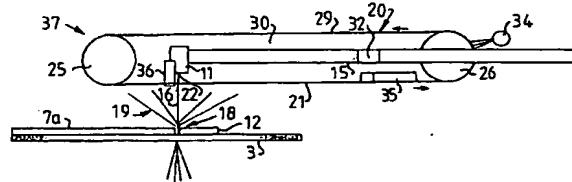
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(54) DISPOSITIF DE PROTECTION UTILISE DANS UN MATERIEL DE DECOUPAGE DE FEUILLES DE PAPIER
(54) PROTECTIVE ARRANGEMENT IN WEB CUTTING

(57)

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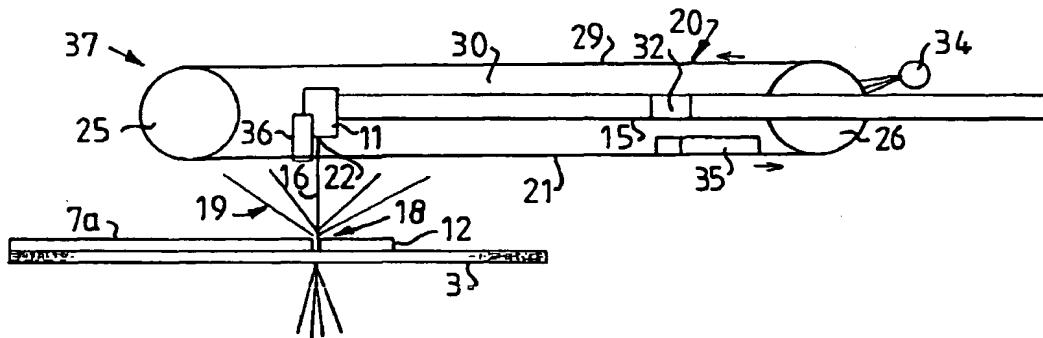
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(57) Abrégé/Abstract:

A protective arrangement (37) for a cutting equipment (10) for dividing a continuous fiber web (7) is described, said cutting equipment being arranged in a board or paper machine and includes at least one cutting member (16) for cutting the fiber web (7). In accordance with the invention the protective arrangement includes an endless belt member (20) movably arranged and having a straight run (21) between the cutting equipment and the fiber web to screen off at least an essential part of the cutting equipment from fibers which are released from the fiber web during the cutting. It also includes one or more cleaning members (34, 35) at least one of which being arranged in connection to the outside of the belt member at a distance from the cutting member, to remove the portion of the released fibers being caught by the belt member. The invention also relates to a board or paper machine that has such a protective arrangement.

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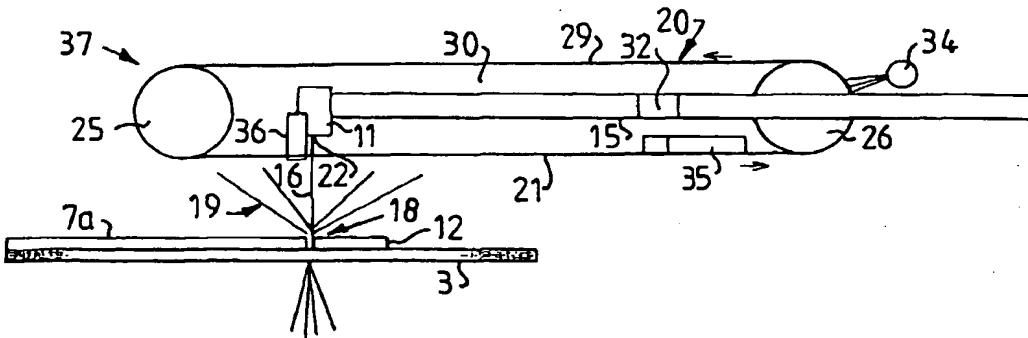
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(57) Abstract: A protective arrangement (37) for a cutting equipment (10) for dividing a continuous fiber web (7) is described, said cutting equipment being arranged in a board or paper machine and includes at least one cutting member (16) for cutting the fiber web (7). In accordance with the invention the protective arrangement includes an endless belt member (20) movably arranged and having a straight run (21) between the cutting equipment and the fiber web to screen off at least an essential part of the cutting equipment from fibers which are released from the fiber web during the cutting. It also includes one or more cleaning members (34, 35) at least one of which being arranged in connection to the outside of the belt member at a distance from the cutting member, to remove the portion of the released fibers being caught by the belt member. The invention also relates to a board or paper machine that has such a protective arrangement.

Protective arrangement in web cutting

The present invention relates to a protective arrangement for a cutting equipment for dividing a continuous fiber web, said cutting equipment being arranged in a board or paper machine for manufacturing said fiber web and comprises at least one cutting member for cutting the fiber web.

10 The invention also relates to a board or paper machine for manufacturing a continuous fiber web, comprising at least one cutting equipment for dividing the fiber web, comprising at least one cutting member for cutting the fiber web.

15 The cutting member generally consists of a water jet delivered from a nozzle. In tail cutting and edge trimming the nozzles are placed relatively close to the paper web. When the thin water jet encounters the fiber web, the water splashes up from the cutting area and forms a water mist while, at the same time, fibers are wrested from the fiber web and carried along with the water mist. Some of these fibers collect on the cutting equipment so that growing aggregations of fibers are arising. In due course clumps of fibers will become detached from these aggregations of fibers and fall down onto the fiber web, and thus they may give rise to web breaks downstream of the cutting equipment. In a subsequent press nip such a fiber clump will be pressed into the fiber web, thus forming a serious indication of fracture in the fiber web, particularly when it will be situated within the edge portions of the fiber web. Furthermore, the quality of the finished web is deteriorated by such fiber clumps pressed into the web.

20 25 30 35 The problem of web breaks caused by such fiber clumps increases with increased machine speed. The problem is especially prevalent in soft paper machines, and

particularly in machines using through air drying (TAD). These fiber clumps which have fallen down are stated to be the main reason for web breaks in a paper machine for soft paper of TAD type in which web breaks are regularly frequent. In some cases the break frequency reaches one web break per hour, which is naturally unacceptable and extremely expensive.

Another problem caused by aggregation of fibers on the cutting equipment is that detached fibers are collected on the nozzle around its orifice so that the growing aggregation of fibers will finally detrimentally influence the water jet, thereby deteriorating its task of dividing the fiber web by a continuous slit.

Attempts have been made to remedy the problems of aggregation of fibers on the cutting equipment such as by sucking away the water mist from the cutting area or squirting the cutting equipment. Common to these attempts is that fibers get caught and collect to form fiber clumps in similar manner also on these auxiliary arrangements and the problem thus remains to a considerable extent.

Additional wrested fibers that may collect on the cutting equipment may also come from the zone where the forming wires diverge from each other and the fiber web is exposed after forming.

Common to the problems discussed above, web breaks and jet influence, is that they lead to serious operational disturbances with shutdowns and deteriorated quality of the finished web and its trimmed edges.

The object of the present invention is to provide a protective arrangement making it possible to

substantially reduce, and in many cases practically eliminate the risk of said operational disturbances.

The protective arrangement in accordance with the 5 invention is characterized in that it includes - an endless belt member movably arranged and having a straight run which is arranged between the cutting equipment and the fiber web to screen off at least an essential part of the cutting equipment from fibers 10 which are released from the fiber web during the cutting, and - one or more cleaning members at least one of which being arranged in connection to the outside of the belt member at a distance from said cutting member, to 15 remove the portion of the released fibers being caught by the belt member.

A board or paper machine in accordance with the invention 20 is characterized in that it includes such a protective arrangement.

The invention will be described in more detail with reference to the drawings.

25 Figure 1 shows schematically a part of a machine section in a paper machine.

Figures 2 and 3 show schematically in a top view and side 30 view, respectively, parts of a cutting equipment for edge trimming the fiber web in the machine section shown in Figure 1 and provided with a protective arrangement in accordance with a first embodiment of the invention.

Figures 4 and 5 show schematically in a top view and side 35 view, respectively, parts of another cutting equipment for edge trimming the fiber web and provided with a

protective arrangement in accordance with a second embodiment of the invention.

5 Figures 6 and 7 show schematically in a top view and side view, respectively, parts of a third cutting equipment for edge trimming to obtain two trimmings and provided with a protective arrangement in accordance with a third embodiment of the invention.

10 Figures 8 and 9 show schematically in a top view and side view, respectively, parts of a cutting equipment similar to that shown in Figure 2 for edge trimming from below and provided with a protective arrangement substantially similar to that shown in Figure 2 but inverted.

15 20 Figures 10 and 11 show schematically in a top view and side view, respectively, parts of a cutting equipment for tail cutting a fiber web and provided with a protective arrangement in accordance with yet another embodiment of the invention.

25 30 35 Figure 1 shows schematically parts of a paper machine for manufacturing soft paper such as tissue and other creped sanitary paper products. The paper machine comprises a machine section in the form of a wet section. The wet section comprises a former 1 and a press section (not shown). The former 1 has a headbox 2, an inner, supporting forming clothing 3, an outer, covering forming clothing 4, a forming roll 5 and a breast roll 6. The forming roll 5 and the breast roll 6 are arranged near each other so that the forming clothings 3, 4 converge on the forming roll 5 to define a wedge-shaped gap between them before they converge. The headbox delivers a single or multi-layer jet of stock into said gap for forming a fiber web 7 by dewatering the stock. The two forming clothings 3, 4 run together over the forming roll 5, and then in individual loops over a plurality of rolls 8 and

9, respectively, arranged to drive, guide, direct and stretch the forming clothings 3, 4.

The wet section is provided with a cutting equipment 10 for dividing the fiber web 7. In Figures 2 and 3 the cutting equipment 10 for edge trimming is shown which comprises a jet-formed cutting member 16 which, in the embodiment shown in Figures 2 and 3, consists of a water jet. The cutting equipment 10 thus comprises an edge trimming nozzle 11 with an orifice 22 to produce an edge trimming 12. The cutting equipment 10 has a stand 13 rigidly mounted on the machine stand 14, and a supporting arm 15, mounted on the stand 13 and carrying said edge trimming nozzle 11 at its inner, free end. In the embodiment shown in Figures 2 and 3 the supporting arm 15 extends preferably horizontally in over the clothing 3 and is adjustable in order to set the edge trimming nozzle 11 in the desired position in relation to the fiber web 7 and its side edge or to the side edge of the clothing 3. The orifice 22 of the edge trimming nozzle 11 delivers said water jet 16 against the moving fiber web 7, the jet cutting through the fiber web 7 so that a continuous, longitudinal slit 17 is formed that divides the fiber web 7 into said edge trimming 12 and an edge-trimmed fiber web 7a. When the water jet 16 encounters the fiber web 7 and the clothing 3, it is dispersed and water from the jet 16 and from the wet fiber web 7 splashes up from the cutting area 18 so that a water mist 19 is formed and spreads up towards the cutting equipment 10. Part of the water jet 16 penetrates the clothing 3 as illustrated in Figure 3. When the water jet 16 encounters the fiber web 7 fibers are also wrested from the fiber web 7. Some of the fibers are broken into fiber fragments. These fibers, including fiber fragments, follow with the water that splashes up from the cutting area 18, and will therefore be contained in said water mist 19.

Figures 2 and 3 show a first embodiment of a protective arrangement 37 in accordance with the invention, arranged in connection to the cutting equipment 10 and comprising a movable, endless belt member 20 with a straight run 21 situated between the edge trimming nozzle 11 of the cutting equipment 10 and the cutting area 18 at the fiber web 7 and preferably as close to the orifice 22 of the edge trimming nozzle 11 as possible, e.g. 0.0-2 cm. The belt member 20 runs in the cross machine direction, preferably perpendicularly thereto. The movable belt member 20 is so designed and arranged that it in no way disturbs the function of the edge trimming nozzle 11 in delivering the desired water jet 16 against the fiber web 7. The belt member 20 is sufficiently wide to ensure that substantially no part of the cutting equipment 10 is encountered by the water mist 19 containing fibers and rising from the cutting area 18. In the embodiment shown in Figures 2 and 3 the belt member 20 consists of two parallel belts 23, 24, passing around a common inner roll 25 and a common outer roll 26, said rolls 25, 26 being rotatably journaled in a common stand 27 supported by the machine stand 14. The outer roll 26 is driven by means of a motor 28 so that the two belts 23, 24 run at low speed in the direction indicated by arrows. The lower and upper horizontal runs 21, 29 of the belts 23, 24 define between them a space 30 sufficiently large to receive the edge trimming nozzle 11 and an inner part 31 of the supporting arm 15, which thus also has a transverse connecting part 32 and an outer part 33 parallel to the inner part 31. The inner roll 25 is situated behind the edge trimming nozzle 11 so that the belts 23, 24 run past it on the lower side and upper side, the inner turning point of the belts 23, 24 being situated at a sufficient distance from the edge trimming nozzle 11 so that all, or as much as possible of the water mist 19 containing fibers encounters the belts

23, 24, as regards the extension of the water mist 19 across the fiber web 7. In connection to the outer roll 26 there is an outer cleaning device 34 for cleaning the outside of the belts 23, 24 with the aid of water sprayed 5 onto the outer side of the movable belts 23, 24 in order to remove fibers that get caught on the belts 23, 24 when they pass over the cutting area 18. Further, an inner cleaning device 35 in the form of a scraper is provided to clean the inner side of the belts 23, 24 from fibers 10 that may penetrate into the space 30 and accumulate on the inside of the belts 23, 24.

In the embodiment shown in Figures 2 and 3 the belts 23, 24 are arranged to overlap each other at the edge 15 parts facing each other, so that no opening between the edges of the belts 23, 24 facing each other appears before and after the edge trimming nozzle 11. At the upstream side (seen in the direction of movement of the belts 23, 24), the edge trimming nozzle 11 is provided 20 with a gap-opening element 36 extending down between the belts 23, 24 and having a vertical, blade-shaped edge facing against the direction of movement of the belts 23, 24, so that the overlapping edge parts of the belts 23, 24 are separated immediately before the edge trimming 25 nozzle 11 and a gap is formed and maintained between the edges of the belts 23, 24 facing each other as they pass the water jet 16, the gap being sufficiently wide to ensure that the water jet 16 does not come into contact 30 with the edge parts of the belts 23, 24. However, the gap should not be too wide so that fibers are able to pass through the gap and get caught on the edge trimming nozzle 11 near its orifice 22. Immediately after the edge 35 parts of the belts 23, 24 have passed the edge trimming nozzle 11 they are automatically returned to their overlapping state. A gap-stabilizing element (not shown) of the same design as the gap-opening element 36 may be arranged immediately after the edge trimming nozzle 11

and with its blade-shaped edge facing in the direction of movement of the belts 23, 24.

During operation some fibers will encounter the outside of the movable belts 23, 24 and then fall down onto the fiber web 7, while other fibers will get caught on the outside of the movable belts 23, 24. Since the belts 23, 24 are in continuous movement, the fibers that have got caught on the belts 23, 24, are carried away from the cutting area 18 so that no large collections have time to be formed, that might grow to such an extent that detrimental fiber clumps may become detached and fall down onto the fiber web 7. Furthermore, the belts 23, 24 are cleaned so that clean surfaces are always arriving at the cutting area. The belts 23, 24 thus have the double function of preventing fibers getting caught and collecting on the cutting equipment 10, resulting in detrimental fiber clumps falling down, and also of preventing fibers getting caught and collecting on the edge trimming nozzle 11 itself, close to its orifice 22, so that this becomes blocked and its function negatively affected, resulting in poorer formation of the slit 17 and division of the fiber web 7.

Figures 4 and 5 show a cutting equipment 10 with a second edge trimming nozzle 40 carried by a supporting arm 41 mounted on the first supporting arm 15. The second edge trimming nozzle 40 is arranged upstream of the first edge trimming nozzle 11, slightly laterally displaced in relation thereto, so that the water jet 16 from the first edge trimming nozzle 11 effects trimming of the edge of the fiber web 7a to make it even straighter than the one obtained with only one water jet.

Figures 4 and 5 show a second embodiment of a protective arrangement 37 in accordance with the invention, which is arranged in connection to the cutting equipment 10 and is

similar to that shown in Figures 2 and 3 except that the belt member 20 consists of three parallel belts 42, 43, 44. The intermediate belt 43 cooperates with the two outer belts 42 and 44 in an overlapping relationship 5 as described earlier for the two belts 23, 24 in Figures 2 and 3. At the upstream side (seen in the direction of movement of the belts 42, 43, 44), each edge trimming nozzle 11, 40 carries a gap-opening element 45, 46 extending between respective pairs of belts 42, 43 and 10 43, 44 and otherwise being arranged and having the same function as described in conjunction with the first embodiment.

Figures 6 and 7 show a cutting equipment 10 similar to 15 that shown in Figures 4 and 5, except that the second edge trimming nozzle 40 is arranged inside the first edge trimming nozzle 11 and at a predetermined distance therefrom, in order to provide a second edge trimming 47 by means of a second water jet 48 forming a second slit 20 49 where more water mist 50 containing fibers is obtained. It should be understood that any number of trimming nozzles or cutting members can be arranged in the cross machine direction.

25 The protective arrangement 37 shown in Figures 6 and 7 is similar to the first embodiment described above, however, a second gap-opening element 51 has been added, which is supported by the second edge trimming nozzle 40 and extends down between the belts 23, 24, having the same 30 function as the following gap-opening element 36.

Figures 8 and 9 show a cutting equipment 10 similar to 35 that shown in Figures 2 and 3, but arranged on the lower side of the clothing 3 so that the water jet 16 first passes through the clothing 3 and thereafter makes the slit 17 in the fiber web 7.

The protective arrangement 37 shown in Figures 8 and 9 is similar to the first embodiment described above, except that the gap-opening element 36 is directed upwards to extend up between the belts 23, 24, since in this case 5 the water jet 16 is acting upwards. In this case the function of the protective arrangement 37 is primarily to protect the edge trimming nozzle 11 and its orifice 22 so that fibers from the water mist 19 containing fibers do not get caught and collect on the edge trimming nozzle 10, having a detrimental influence on the function of the edge trimming nozzle by wholly or partially clogging the orifice 22.

Figures 10 and 11 show parts of a machine section 15 provided with a cutting equipment 10 for dividing the fiber web 7, and more particularly for tail cutting in order to provide a tail 60. The cutting equipment 10 comprises a tail nozzle 61 with an orifice 62 that delivers a sharp water jet 63 against the movable fiber 20 web 7, said water jet cutting through the fiber web 7 so that a continuous slit 64 is formed that divides the fiber web 7 into said tail 60 and a fiber web 7b which, downstream of the cutting equipment 10, is deflected to a reject (not shown). The cutting equipment 10 is arranged 25 on a stand 65 supported by the machine stand 14 and comprising a transverse beam 66 extending across the fiber web 7, at a predetermined distance above this. The cutting equipment 10 is movably mounted along the beam 66 for displacement by an actuator (not shown) from a 30 resting position at and outside the one side edge 67 of the fiber web 7, towards the other side edge 68, to be set in a desired active position at a predetermined distance from said second side edge 68, in order to provide said tail 60 of desired width. It will be 35 understood that the cutting equipment 10 is in operation even while being moved from and to said resting position

and the slit 64 therefore has an oblique extension in relation to the machine direction.

Figures 10 and 11 illustrate yet another embodiment of a protective arrangement 37, arranged in connection to the cutting equipment 10 and its path of movement, which has a great similarity to the first embodiment of the protective arrangement in accordance with Figures 2 and 3. The protective arrangement 37 thus has a movable, endless belt member 20 with a straight run 21 situated between the tail nozzle 61 of the cutting equipment 10 and the cutting area 18 at the fiber web 7 and preferably as close to the orifice 62 of the edge trimming nozzle 11 as possible, e.g. 0.0-2 cm. The belt member 20 runs in the same direction as the direction of movement of the cutting equipment 10, i.e. perpendicularly to the machine direction. In order to protect the cutting equipment 10 along its entire path of movement, therefore, the belt member 20 extends across the entire width of the fiber web 7. The belt member 20 consists of two parallel belts 69, 70, passing around two common outer rolls 71, 72 which are rotatably journaled in stands 73, 74 supported by the machine stand 14. The stand 74 of the one roll 72 (the right one in the Figures) is movably carried on the machine stand 14 and is provided with a stretching device (not shown) to stretch the belts 69, 70 via the roll 72, as indicated by the arrow 75 in Figure 10. The right-hand roll 72 is driven by a motor 76 so that the two belts 69, 70 run at a low speed in the direction indicated by arrows. The lower and upper horizontal runs 21, 29 of the belts 69, 70 define between them a space 30 sufficiently large to receive the tail nozzle 61 and the beam 66. The protective arrangement 37 is also provided with cleaning devices (not shown) as described earlier. The belts 69, 70 are arranged to overlap each other with their edge parts facing each other, so that no opening between the edges of the belts 69, 70 facing each other appears

before and after the tail nozzle 61, regardless of where it may be. At the upstream side (seen in the direction of movement of the belts 69, 70), the tail nozzle 61 carries a gap-opening element 77 extending down between the belts 5 69, 70 and having a vertical, blade-shaped edge facing against the direction of movement of the belts 69, 70, so that the overlapping edge parts of the belts 69, 70 are separated immediately before the tail nozzle 61, a gap thus being formed and maintained between the edges of the 10 belts 69, 70 facing each other as they pass the water jet 63, the gap being sufficiently wide to ensure that the water jet does not come into contact with the edge parts of the belts 69, 70. However, the gap should not be so wide as to allow fibers to pass through the gap and get 15 caught on the tail nozzle 61 near its orifice 62. Immediately after the edge parts have passed the tail nozzle 61 they are automatically returned to their overlapping state. A gap-stabilizing element of the same design as the gap-opening element 77 may advantageously 20 be arranged immediately after the tail nozzle 61 and with its blade-shaped edge facing in the direction of movement of the belts 69, 70.

Driving of the belts 69, 70 is started by the motor 76, 25 as soon as or just before the cutting equipment 10 is activated to be moved from its resting position, and is stopped as soon as or just after the cutting equipment 10 has been disconnected after returning to its resting position. Said activation includes movement and also 30 forming of said slit 64. During operation of the cutting equipment 10, some fibers will encounter the outside of the movable belts 69, 70 and then fall down onto the fiber web 7, while other fibers will get caught on the outside of the movable belts 69, 70. Since the belts 35 69, 70 are in continuous movement, the fibers that got caught on the belts 69, 70, are carried away from the cutting area 18 so that no large aggregations have time

to be formed, that might grow to such an extent that detrimental fiber clumps may become detached and fall down onto the fiber web 7. Moreover, the belts 69, 70 are cleaned so that clean surfaces always arrive at the

5 cutting area. The belts 69, 70 thus have the double function of preventing fibers getting caught and collecting on the cutting equipment 10, resulting in detrimental fiber clumps falling down, and also of preventing fibers getting caught and collecting on the

10 tail nozzle 61 itself, close to its orifice 62, so that this becomes blocked and its function negatively affected, resulting in poorer formation of the slit 64 and division of the fiber web 7.

15 In the described embodiments of the cutting equipment, a water jet is used as cutting member, however, the protective arrangement in accordance with the invention may naturally be used with a cutting equipment that has other types of cutting members which cause the same

20 problems as described in the introduction, e.g. air jet, laser jet, ultrasound, depending on the location of the cutting equipment in the machine.

25 The alignment of the protective arrangement may be varied from the cross machine direction to the machine direction. Furthermore, the protective arrangement may also extend so that it is parallel with the plane of the fiber web, or so that it forms an angle with this. The cutting equipment and associated protective arrangement

30 in accordance with the invention can be placed within various machine sections of a board or paper machine. The paper machines shown are soft paper machines, but a cutting equipment with associated protective arrangement in accordance with the invention can naturally be used in

35 all types of board or paper machines.

C L A I M S

1. A protective arrangement (37) for a cutting equipment (10) for dividing a continuous fiber web (7),
5 said cutting equipment (10) being arranged in a board or paper machine for manufacturing said fiber web (7) and includes at least one cutting member (16) for cutting the fiber web (7), characterized in that it includes
 - an endless belt member (20) movably arranged and having a straight run (21) which is arranged between the cutting equipment (10) and the fiber web (7) to screen off at least an essential part of the cutting equipment (10) from fibers which are released from the fiber web (7) during the cutting, and
 - one or more cleaning members (34, 35) at least one of which being arranged in connection to the outside of the belt member (20) at a distance from said cutting member (16), to remove the portion of the released fibers being caught by the belt member (20).
- 20 2. A protective arrangement as claimed in claim 1, characterized in that the belt member (20) comprises at least two parallel, endless belts (23, 24), each forming its part of said screening-off run (21) and in that the belts (23, 24) define a gap between them, at least when they pass the cutting member (16) in order to give free passage therefor.
- 25 3. A protective arrangement as claimed in claim 2, characterized in that the belts (23, 24) are arranged to run around two common, parallel rolls (25, 26) arranged at a predetermined distance from each other.
- 30 4. A protective arrangement as claimed in claim 2 or 3, characterized in that the belts are arranged to run at a distance from each other so that their edges facing each

other define said gap between them within at least their screening-off run parts.

5. 5. A protective arrangement as claimed in any one of claims 2-4, characterized in that said gap is 1-5 mm, preferably 2-3 mm larger than the thickness of the cutting member (16) measured perpendicularly to the parallel edges of the belts (23, 24).

10 6. A protective arrangement as claimed in claim 2, characterized in that the two belts (23, 24) are arranged to overlap each other with their edge parts facing each other, and in that it includes a gap-opening element (36) arranged upstream of the cutting member (16), seen in the direction of movement of the belts (23, 24), and extending down/up between the edges of the belts (23, 24) facing each other in order to separate the belts (23, 24) upon passage of the cutting member (16) while forming said gap.

15 20 7. A protective arrangement as claimed in claim 6, characterized in that said gap is converging and ceases a predetermined distance after the cutting member (16) seen in the direction of movement of the belts (23, 24).

25 8. A protective arrangement as claimed in claim 6, characterized in that a gap-stabilizing element is arranged downstream of the cutting member (16), extending down/up between the edges of the belts (23, 24) facing each other in order to widen the gap so that it has a substantially constant width between the gap-opening element and the gap-stabilizing element, between which elements the gap extends.

30 35 9. A protective arrangement as claimed in any one of claims 1-8, characterized in that a cleaning member (35) is also arranged in connection to the inside of the belt

member (20) at a distance from the cutting member (16), in order to remove fibers that are collecting on the inside of the belt member (20).

5 10. A protective arrangement as claimed in any one of claims 1-9, characterized in that the cutting equipment (10) includes at least one nozzle (11; 61) for delivering said cutting member (16) in the form of an air jet or water jet.

10 11. A protective arrangement as claimed in any one of claims 1-10, characterized in that the cutting equipment (10) is arranged for edge trimming the fiber web (7) with the aid of at least one cutting member (16) to obtain at 15 least one trimming, and is stationary during the cutting operation.

20 12. A protective arrangement as claimed in any one of claims 1-10, characterized in that the cutting equipment (10) is movably arranged across the fiber web (7) between a resting position outside the fiber web and an active position above the fiber web for tail cutting the fiber web in order to provide a tail (60), and in that said 25 belt member (20) is arranged to extend between at least said resting position and said active position for the cutting equipment (10) and to be activated simultaneously or substantially simultaneously with the activation of the cutting equipment (10).

30 13. A board or paper machine for manufacturing a continuous fiber web (7), including at least one cutting equipment (10) for dividing the fiber web, including at least one cutting member (16) for cutting the fiber web (7), characterized in that it also includes a protective 35 arrangement (37) that includes - an endless belt member (20) movably arranged and having a straight run (21) which is arranged between the

cutting equipment (10) and the fiber web (7) to screen off at least an essential part of the cutting equipment (10) from fibers which are released from the fiber web (7) during the cutting, and

5 - one or more cleaning members (34, 35) at least one of which being arranged in connection to the outside of the belt member (20) at a distance from said cutting member (16), to remove the portion of the released fibers being caught by the belt member (20).

10

14. A board or paper machine as claimed in claim (13), characterized in that the belt member (20) comprises at least two parallel, endless belts (23, 24), each forming its part of said screening-off run (21) and in that the 15 belts (23, 24) define a gap between them, at least when they pass the cutting member (16) in order to give free passage therefor.

20

15. A board or paper machine as claimed in claim 14, characterized in that the belts (23, 24) are arranged to run around two common, parallel rolls (25, 26) arranged at a predetermined distance from each other.

25

16. A board or paper machine as claimed in claim 14 or 15, characterized in that the belts are arranged to run at a distance from each other so that their edges facing each other define said gap between them within at least their screening-off run parts.

30

17. A board or paper machine as claimed in any one of claims 14-16, characterized in that said gap is 1-5 mm, preferably 2-3 mm larger than the thickness of the cutting member (16) measured perpendicularly to the parallel edges of the belts (23, 24).

35

18. A board or paper machine as claimed in claim 14, characterized in that the two belts (23, 24) are arranged

to overlap each other with their edge parts facing each other, and in that it includes a gap-opening element (36) arranged upstream of the cutting member (16), seen in the direction of movement of the belts (23, 24), and

5 extending down/up between the edges of the belts (23, 24) facing each other in order to separate the belts (23, 24) upon passage of the cutting member (16) while forming said gap.

10 19. A board or paper machine as claimed in claim 18, characterized in that said gap is converging and ceases a predetermined distance after the cutting member (16) seen in the direction of movement of the belts (23, 24).

15 20. A board or paper machine as claimed in claim 18, characterized in that a gap-stabilizing element is arranged downstream of the cutting member (16), extending down/up between the edges of the belts (23, 24) facing each other in order to widen the gap so that it has a

20 substantially constant width between the gap-opening element (36) and the gap-stabilizing element, between which elements the gap extends.

25 21. A board or paper machine as claimed in any one of claims 13-20, characterized in that a cleaning member (35) is also arranged in connection to the inside of the belt member (20) at a distance from the cutting member (16), in order to remove fibers that are collecting on the inside of the belt member (20).

30 22. A board or paper machine as claimed in any one of claims 13-21, characterized in that the cutting equipment (10) includes at least one nozzle (11; 61) for delivering said cutting member (16) in the form of an air jet or

35 water jet.

23. A board or paper machine as claimed in any one of claims 13-22, characterized in that the cutting equipment (10) is arranged for edge trimming the fiber web (7) with the aid of at least one cutting member (16) to obtain at 5 least one trimming, and is stationary during the cutting operation.

24. A board or paper machine as claimed in any one of claims 13-22, characterized in that the cutting equipment 10 (10) is movably arranged across the fiber web (7) between a resting position outside the fiber web and an active position above the fiber web for tail cutting the fiber web in order to provide a tail (60), and in that said belt member (20) is arranged to extend between at least 15 said resting position and said active position for the cutting equipment (10) and to be activated simultaneously or substantially simultaneously with the activation of the cutting equipment (10).

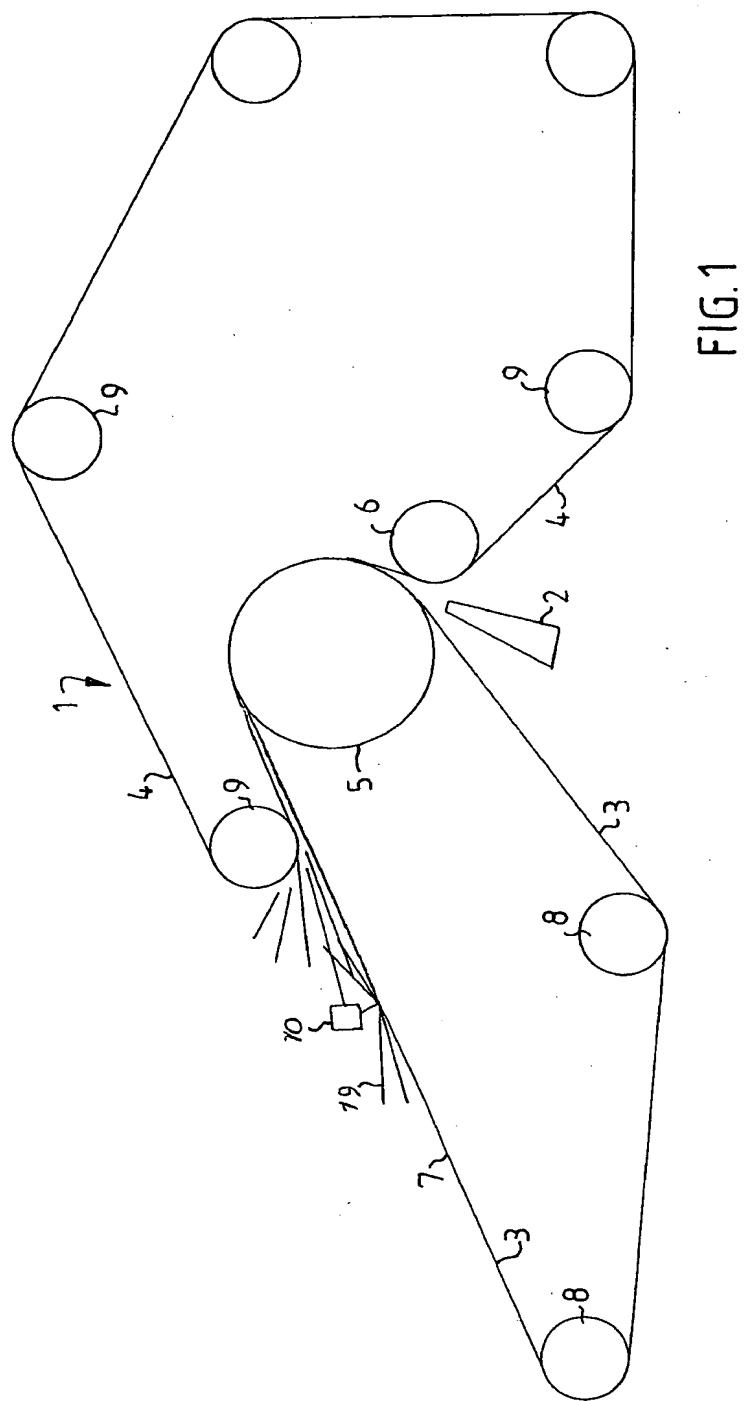
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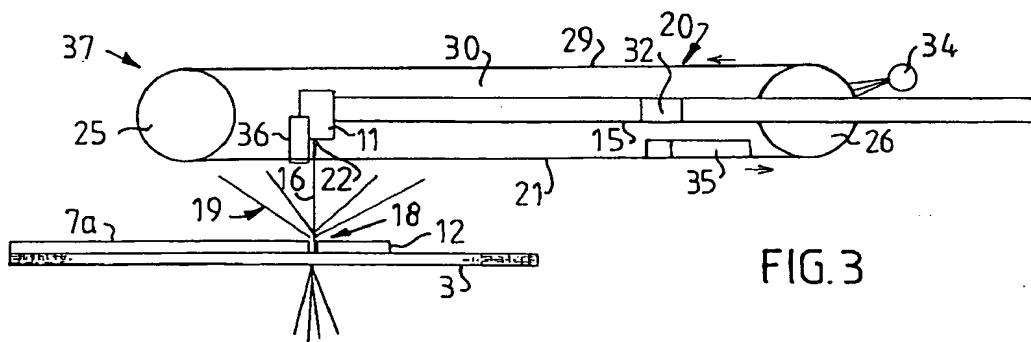
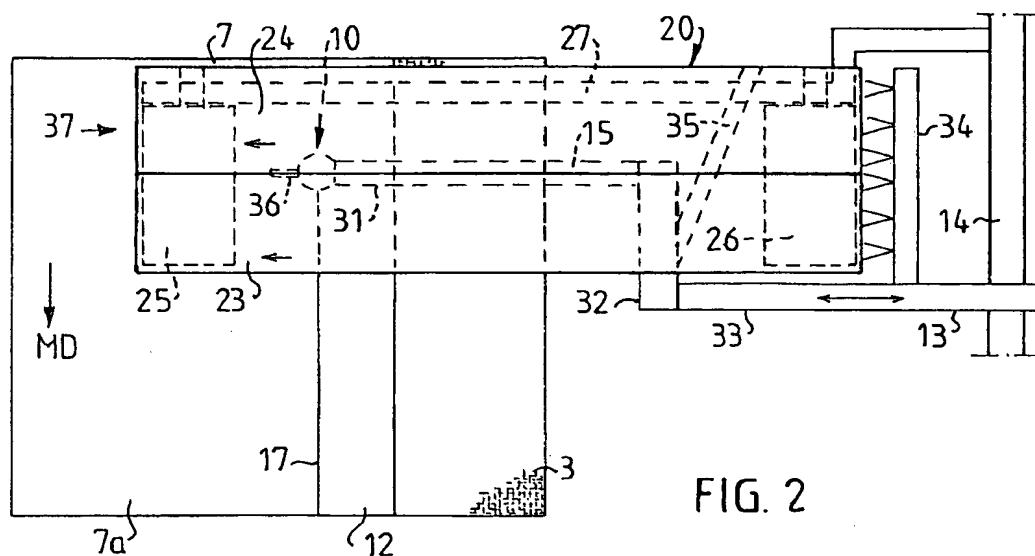
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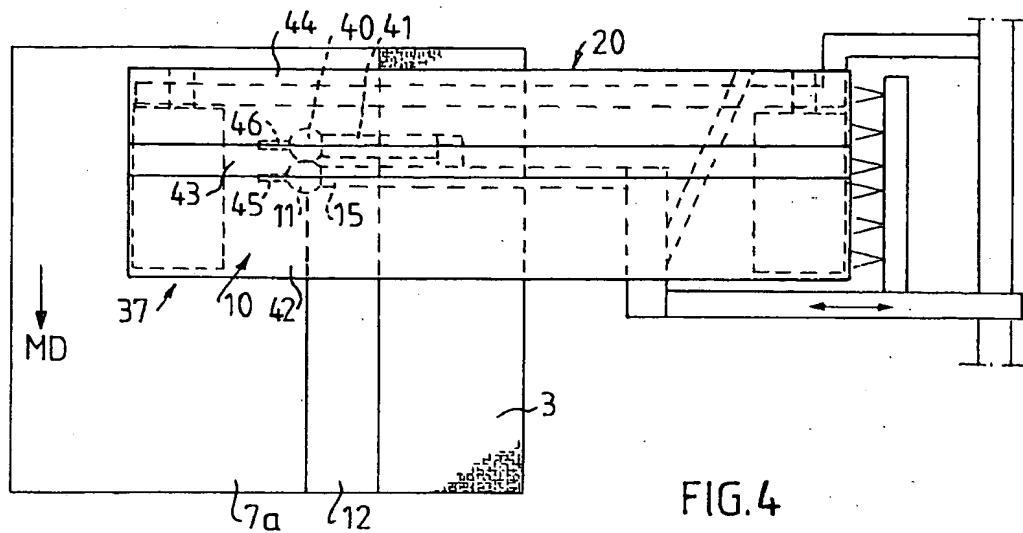


FIG. 4

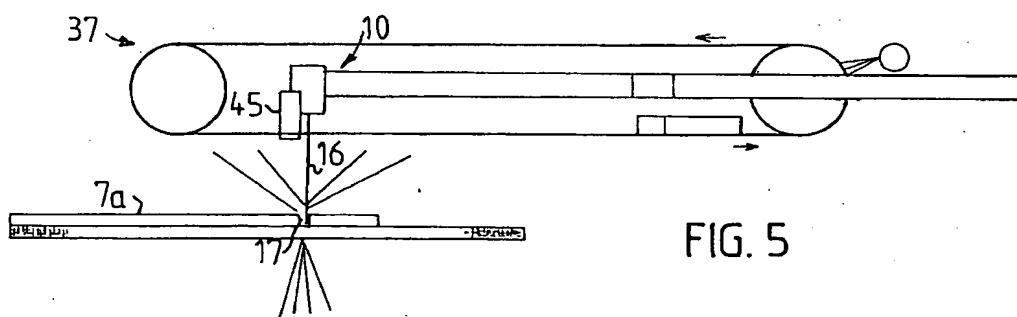
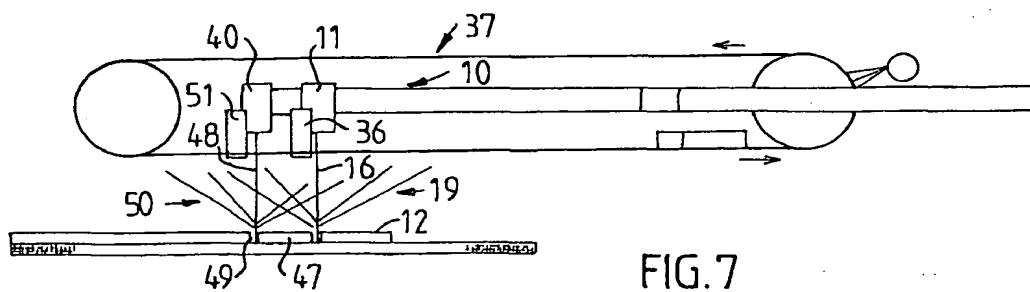
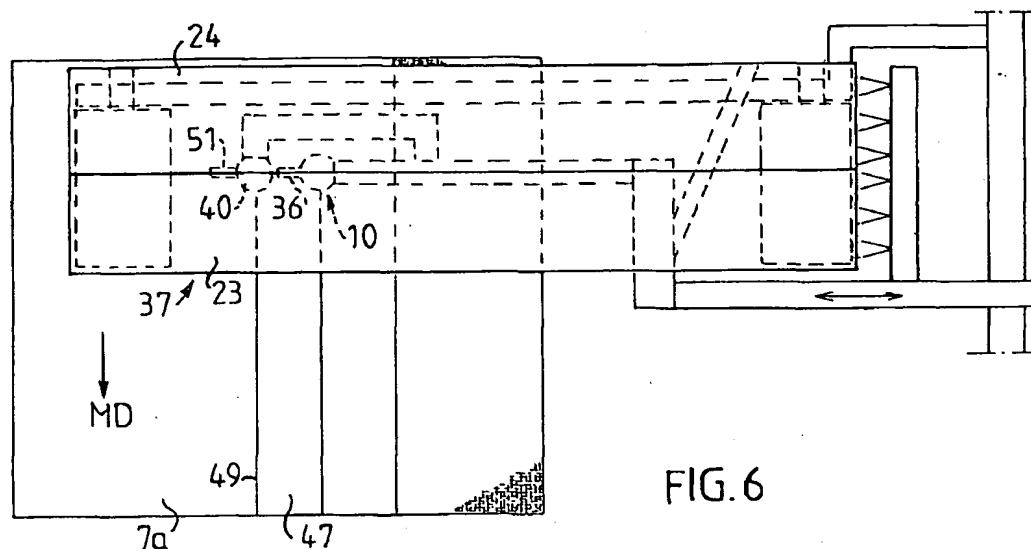


FIG. 5

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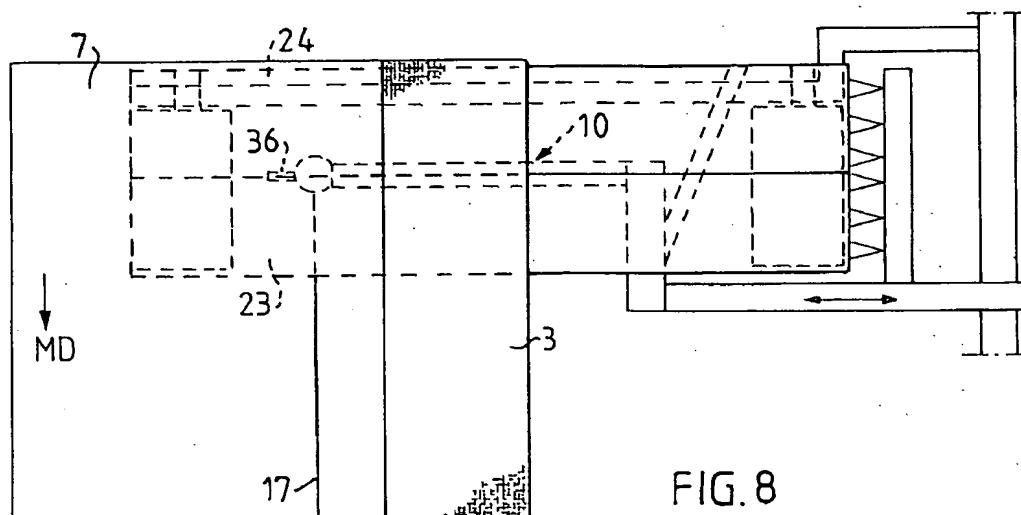


FIG. 8

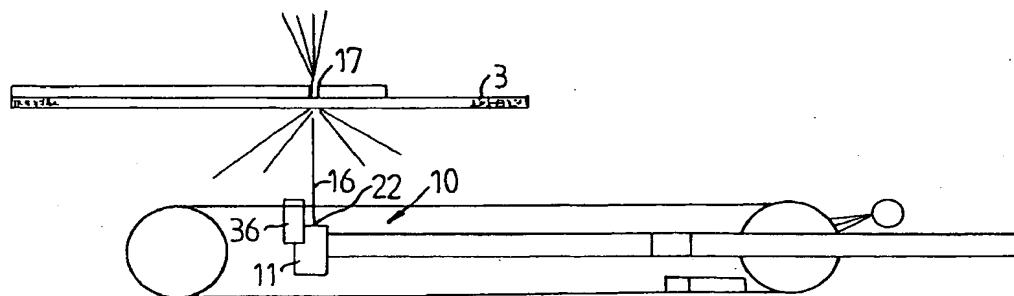


FIG. 9

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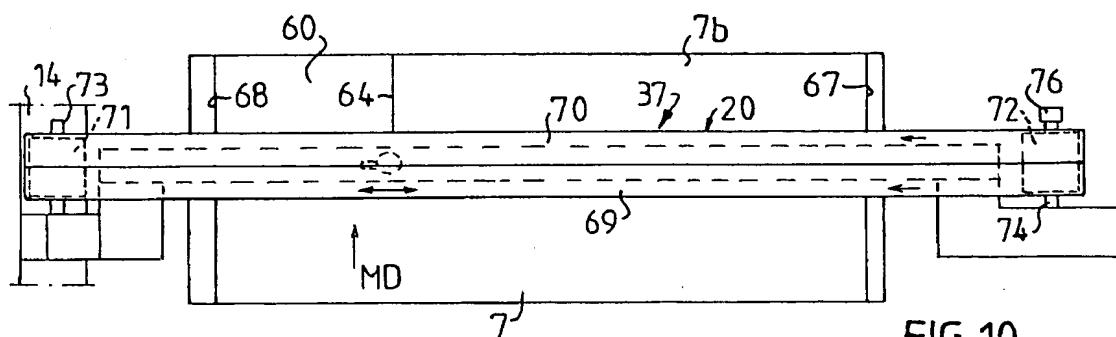


FIG. 10

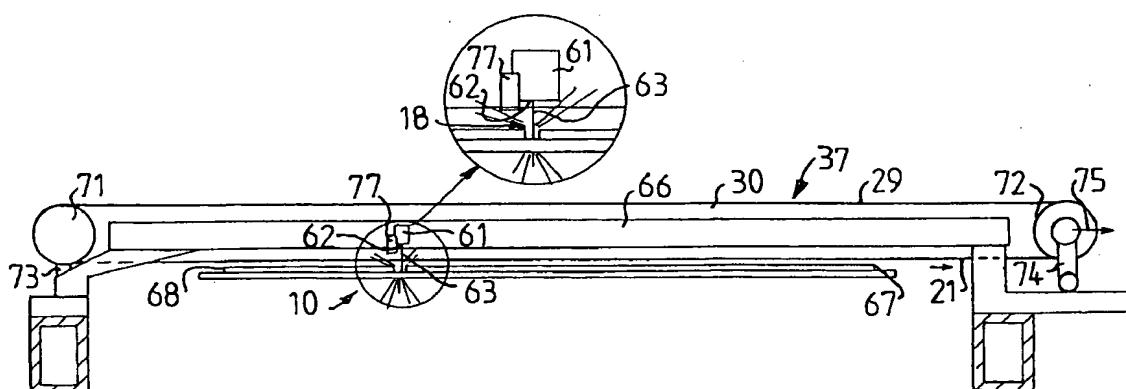


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2005/000376

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21G 9/00, D21F 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: D21G, D21F, B26D, F16C, B66C, B25K, E02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPO-INTERNAL, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4299533 A (MAKOTO OHNAKA), 10 November 1981 (10.11.1981), The whole document especially fig. 2 and 5 --	1-26
A	WO 9011165 A1 (KLINTBERG, NICLAS), 4 October 1990 (04.10.1990), figure 1, claim 1 --	1-26
A	US 4396344 A (KOICHI SUGIMOTO ET AL), 2 August 1983 (02.08.1983), column 3, line 1 - line 47, figures 3,5,6,7 --	1-26
A	EP 0118845 A1 (SCHLIMM, NORBERT), 19 Sept 1984 (19.09.1984), figure 1, claims --	1-26

 Further documents are listed in the continuation of Box C. See patent family annex.

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- "&" document member of the same patent family

Date of the actual completion of the international search 30 May 2005	Date of mailing of the international search report 14-06-2005
Name and mailing address of the ISA/ Swedish Patent Office Box 5035, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Erika Westberg/MP Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2005/000376

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CA 2419660 A1 (METSO PAPER KARLSTAD AB), 25 April 2002 (25.04.2002), page 1, line 15 - page 2, line 7; page 5, line 4 - page 7, line 11, figures 2,3 --	1-26
A	US 5762759 A (GREGORY L. WEDEL), 9 June 1998 (09.06.1998), column 2, line 35 - line 55; column 4, line 5 - line 22, figure 3 --	1-26
A	GB 2189227 A (OY TAMPELLA AB), 21 October 1987 (21.10.1987), figure 2 -- -----	1-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/04/2005

International application No.
PCT/SE 2005/000376

US	4299533	A	10/11/1981	AU	509159 A,B	24/04/1980
				CA	1074353 A	25/03/1980
				DE	2842456 A	20/12/1979
				FR	2427884 A	04/01/1980
				GB	2022046 A,B	12/12/1979
				IT	1101358 B	28/09/1985
				IT	7823457 V	04/12/1978
				IT	7830514 D	00/00/0000
				JP	54159964 A	18/12/1979
				JP	54168623 U	28/11/1979
				SE	7810565 A	07/12/1979
WO	9011165	A1	04/10/1990	DE	69019963 D,T	22/02/1996
				EP	0464129 A,B	08/01/1992
				SE	502256 C	25/09/1995
				SE	8901019 A	23/09/1990
US	4396344	A	02/08/1983	DE	3038419 A,C	30/04/1981
				FR	2467060 A,B	17/04/1981
				GB	2061872 A,B	20/05/1981
				GB	2125767 A,B	14/03/1984
				GB	8300429 D	00/00/0000
				GB	8305700 D	00/00/0000
				JP	1473457 C	27/12/1988
				JP	56051113 U	07/05/1981
				JP	56056395 A	18/05/1981
				JP	63012752 B	22/03/1988
EP	0118845	A1	19/09/1984	DE	3308474 A	13/09/1984
				AT	28048 T	15/07/1987
				DE	3308475 A	13/09/1984
				JP	59169785 A	25/09/1984
CA	2419660	A1	25/04/2002	BR	0114211 A	21/10/2003
				EP	1332257 A	06/08/2003
				SE	517431 C	04/06/2002
				SE	0003773 A	20/04/2002
				US	20040069107 A	15/04/2004
				WO	0233169 A	25/04/2002
				EP	1483937 A	08/12/2004
				SE	523100 C	30/03/2004
				SE	0102208 A	22/12/2002
				US	20040234091 A	25/11/2004
				WO	03001846 A	03/01/2003
US	5762759	A	09/06/1998	WO	9832919 A	30/07/1998
GB	2189227	A	21/10/1987	CA	1280394 A,C	19/02/1991
				DE	3712351 A,C	22/10/1987
				FI	74315 B,C	30/09/1987
				FI	861649 D	00/00/0000
				GB	8706682 D	00/00/0000
				SE	466316 B,C	27/01/1992
				SE	8701191 A	19/10/1987
				US	4818343 A	04/04/1989